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MCS OF CENTRAL WASHINGTON

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11/4/2013

Yakima City Council Members

Re: Moratorium on Recreational Marijuana

Dear Council members,

I write to introduce myself and the entity for which I serve as Executive Director, which is MCS of Central Washington, a Washington nonprofit corporation. MCS is a medical marijuana cooperative. We have helped numerous patients for whom medical marijuana eases pain and suffering and for whom, like in my case, has been life-saving (which I'll elaborate on below). Our organization is and has been following closely the status of legislation and rule-making at the state and local level; for example, we attended the City Council Study Session on October 8, 2013 at which the moratorium to enable the thoughtful consideration of an ordinance regulating recreational marijuana was approved, we've previously contacted and met with the Yakima Sheriff's office and City legal department to share information about our organization, and we're monitoring closely the state rule-making processes such as the Liquor Control Board rule-making efforts both with regard to I-502, as well as the LCB's October 21, 2013 draft recommendations of the Medical Marijuana Work Group. In short, we're a well-informed group advocating the right to treat patients with legitimate medical needs and we want our industry to be regulated to remove the charlatans, black market profiteers, and gang 'businessmen'. But right now, those illegitimate businesses prosper within the City of Yakima, while ours, which adheres to the rules in place, suffers because of the outright ban under YMC 15.01.035.

Now, why I'm such a supporter of responsible, regulated medical marijuana within the Yakima City limits. I am a patient, too. My story began at age fourteen, when I was diagnosed with ulcerative colitis. A horrible inflammatory bowel disease. It progressed at an astonishing rate and by nineteen I was forced to drop out of college due to the severity of my symptoms. Within six months my body had shut down and began to reject any type of nourishment. By the time I was admitted into Virginia Mason hospital I was nearing seventy pounds and it was determined I couldn't survive the surgeries. After exhausting all avenues, my surgeon asked for my permission to try cannabis as an option to spark my body's need for food. A few hours later a nurse came back from a local underground dispensary and they wheeled me down to the showers undergoing a remodel. I smoked my first joint at seventy three pounds and dying. I finally ate. It didn't come back up and I didn't double over in pain or blackout. I gained enough weight to survive the initial surgery that removed my colon and the majority of my large intestine, and I am only here due to cannabis's ability to solve a problem modern medicine could not. I since have used a cannabis related post surgical care plan and have not needed to see a doctor but a handful of times since having had my surgeries.

All of us at MCS have similar stories which make us believers in the responsible use of medical cannabis. However, another source of inspiration comes from the countless tear filled thanks' we receive from our members and their family members who have found relief for the first time with cannabis. Such a benign product, with such phenomenal potential, should not be kept from those searching for alternative means of medical relief in our community.

What we find illogical, is that the 'recreational' dispensation of marijuana (for fun) is being considered for rule-making legislation (not that we're necessarily opposed to that), while the outright ban on medical marijuana still appears to be staunchly supported by the Council. Our rhetorical question is why we're willing to ban the most commonly and overwhelmingly accepted version of cannabis use , medicinal..... while encouraging the most controversial version of use, recreational? Recreational cannabis can not provide the

care and level of medicinal benefits that medical cannabis can. We have specifically developed cannabis, which we produce with the aid of professional agronomists, botanists, and horticulturalists for patient illnesses and diseases. In, fact, the two "versions" of cannabis medicinal vs. recreational, couldn't be more different. Asking a medical cannabis patient to go to a recreational store for their medicine is like telling a terminally ill cancer patient to try a Budweiser to cope with their symptoms.

I understand that the upcoming City Council meeting is simply to approve the moratorium on enactment of recreational marijuana regulations. We'll nevertheless be in attendance. I'll make a point of introducing myself and MCS to the Council, with the hopes that along with this letter we can commence a discussion with the Council about re-visiting the topic of regulating medical marijuana for authorization within Yakima City limits, as the State is presently examining the issue on a wider scale.

Sincerely,

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Coalition for Cannabis Ethics and Standards

This document was approved by the Coalition for Cannabis Standards and Ethics. It contains minimum standards for Production Facilities for Coalition members. It is our hope that these standards will serve the medical cannabis community. In an effort to self-regulate the cannabis industry, we will hold ourselves to the following minimum standards:

Production Facilities Shall:

1. State and local business licenses are to be obtained and maintained by the business entity operating the production facility.
2. Production facilities are to be built to comply with local building code.
3. Pesticide handler permits are to be obtained and maintained for any applicator of chemicals to any cannabis crops.
4. Material Safety Data Sheets (MSDS) for all applicable hazardous materials are to be kept on site and available to employees that may be exposed to them as required by state law.
5. Production facilities are to have and maintain an adequate security system to prevent robbery and theft.
6. Production facilities are to maintain proper ventilation systems to ensure that there is no odor exterior of the facility.
7. Production facilities will not be closer than 500' from an accredited K-12 school and adhere to local zoning laws.
8. No exterior signage is to be used to identify the presence of a production facility.
9. Production facilities will not have any firearms on the premises at any time.
10. No cannabis should be visible from the outside of the production facility including when exterior doors are opened.
11. No grow supplies shall be stored in the exterior of the production facility that may be viewable to the public.
12. Exterior of production facilities are to be maintained and have a clean and orderly appearance.
13. Proper flushing is to be performed at the end of the grow cycle of any crop to remove excess nutrients and chemicals. Flushing time and technique is to be recorded on Crop Lifecycle Information Sheet (CLIS).
14. Proper curing is to be performed to ensure quality of medicine and avoid contaminants. Curing method is to be detailed on CLIS sheet.
15. All crops are to have a CLIS detailing grow methods and chemicals that is made available to the access point. Business information will not be shared with the consumer.
16. All waste by-products are to be disposed of in an environmentally responsible manner.

Coalition for Cannabis Ethics and Standards
Proposed Guidelines for Processors

This document was approved by the Coalition for Cannabis Standards and Ethics. It contains minimum standards for Medicated Edibles for Coalition members. It is our hope that these standards will serve the medical cannabis community. In an effort to self-regulate the cannabis industry, we will hold ourselves to the following minimum standards:

Processors shall:

1. Pay all governmental liabilities that are incurred as a result of doing business in Washington State, including:
    a. B & O (State)
    b. Payroll / Employee (Federal/L&I/Employment Security)
    c. Federal Income Tax
    d. Business Liability Insurance

2. Obtain and maintain King County Food Workers Permit(s) and abide by the following standards:
    a. All patients engaged in production must have a valid Food Workers Permit
    b. Copies of patient(s) King County Food Workers Permit(s) or permit number must be made available to Access Points

3. Follow applicable FDA labeling guidelines by providing an easy to read label that provides the following elements:
    a. Principal Display Panel (Product Name and Net Weight)
    b. Nutrition Panel (Ingredients, Nutrition Facts, Amount of Cannabis by Gram In Individual Product and Manufacturer/Distributor Contact)
    c. Legal & Cautionary Panel (Expiration Date, Reference To WA Medical Cannabis Law, Warning To "Keep Away From Children", "No Resale" and "No Consumption While Operating Heavy Machinery" Instructions)

4. Follow all applicable FDA packaging requirements including:
    a. Providing food grade, air tight packaging with tamper resistant closures
    b. Packaging products immediately post-production

5. Maintain Processing Facility standards, which Include:
    a. During production, area is to be used exclusively for processing
    b. Only sanitized, non-porous surfaces are to be used in production
    c. Food Worker Permit(s) are to be made accessible in facility

6. Not produce edibles REQUIRING refrigeration or hot handling in a personal kitchen. Proper facilities for the production of edibles REQUIRING refrigeration or hot handling include:

a. King County Department of Health regulated food establishments
b. Department of Agriculture regulated food processing establishments

7. Verify that all medicine used in product comes from authorized Washington State Patient(s) by carefully choosing patient growers or utilizing chain of custody & testing credentials

8. Maintain branding and advertising that does not target minors

9. Practice exterior odor control and maintain compliance with applicable Chronic Nuisance laws and local zoning regulations

Coalition for Cannabis Standards and Ethics

Access Point Subcommittee

This document was approved by the Coalition for Cannabis Standards and Ethics. It contains minimum standards for Access Points for Coalition members. It is our hope that these standards will serve the medical cannabis community. In an effort to self-regulate the cannabis industry, we will hold ourselves to the following minimum standards:

Access points shall:

1. Pay all governmental liabilities that are incurred as a result of doing business in Washington State. These include:
    a. Business & Occupation taxes.
    b. Employment taxes.
    c. Federal income tax.
    d. Retail tax should be paid unless this is contrary to the advice of the access point's legal counsel.
2. Carry standard business liability insurance.
3. Require all staff members that handle medicine to obtain Food Handler's Permits.
4. Adhere to strict initial verification standards before patient obtains medicine including:
    a. Checking valid Government issued ID.
    b. Checking tamper proof recommendation.
    c. Verifying patient recommendation via
        i. online check for active doctors license by using
            1. www.doh.wa.gov.
        ii. phone or online verification with doctors' office.
5. Adhere to Care Providers policies including:
    a. Bringing patient in to facility for the first visit.
    b. Requiring Care Provider Documentation, Medical power of attorney preferred
    c. Access points are not required to accommodate care providers.
6. Adhere to crime prevention standards including:
    a. Positively engaging with communities and business neighbors.
    b. Maintaining a comprehensive security system including:
        i. camera system(s).
        ii. alarm system(s).
        iii. panic button(s).
    c. Possessing no firearms on premises.
    d. Requiring a minimum of one locked door between public and medicine.
7. Adhere to policies for patients under age 18 including:
    a. Requiring one verified legal guardian who is designated as care provider to be present at all times.
    b. Requiring care providers to make transactions and carry out medicine.
    c. Access points are not required to accommodate patients under 18.
8. Secure any patient files by keeping hard copies under lock and key for staff access only and maintaining secure encryption protocols for electronic files.
9. Maintain tasteful and professional advertising, which does not target minors.
10. Create and maintain policies for quality control of medicine including:
    a. Visual inspection.
    b. Requiring producer to use non-systemic pesticides during flower cycle.
    c. Requiring producer to control pathogens including:
        i. Mites / Thrips / Other Pests

ii. Molds / Mildew
iii. Animal hair / Other foreign adulterants

11. Require that all medicine is produced in Washington State.
12. Adhere to Chapter 70.160 RCW: Smoking in public places (formerly Washington clean indoor air act).
13. Provide physical accessibility to patients by maintaining ADA compliance.

Medical Cannabis Facts Sheet

A 2002 review of medical literature by Franjo Grotenhermen states that medical cannabis has established effects in the treatment of nausea, vomiting, premenstrual syndrome, unintentional weight loss, insomnia, and lack of appetite. Other "relatively well-confirmed" effects were in the treatment of "spasticity, painful conditions, especially neurogenic pain, movement disorders, asthma, [and]glaucoma".[19]

Preliminary findings indicate that cannabis-based drugs could prove useful in treating adrenal disease, inflammatory bowel disease,migraines, fibromyalgia, and related conditions.[20]

Medical cannabis has also been found to relieve certain symptoms of multiple sclerosis[21] and spinal cord injuries[22][23][24][25][26] by exhibiting antispasmodic and muscle-relaxant properties as well as stimulating appetite.

Other studies state that cannabis or cannabinoids may be useful in treating alcohol abuse,[27] amyotrophic lateral sclerosis,[28][29]collagen-induced arthritis,[30] asthma,[31] atherosclerosis,[32] bipolar disorder,[33][34] colorectal cancer,[35] HIV-associated sensory neuropathy,[36] depression,[37][38][39][40] dystonia,[41] epilepsy,[42][43][44] digestive diseases,[45] gliomas,[46][47] hepatitis C,[48]Huntington's disease,[49][50] leukemia,[51] skin tumors,[52] methicillin-resistant *Staphylococcus aureus* (MRSA),[53] Parkinson's disease,[54] pruritus,[55][56] posttraumatic stress disorder (PTSD),[57] psoriasis,[58] sickle-cell disease,[59] sleep apnea,[60] and anorexia nervosa.[61] Controlled research on treatingTourette syndrome with a synthetic version of THC called (Marinol), showed the patients taking the pill had a beneficial response without serious adverse effects;[62] other studies have shown that cannabis "has no effects on tics and increases the individuals inner tension".[63] Case reports found that cannabis helped reduce tics, but validation of these results requires longer, controlled studies on larger samples.[64][65]

A study done by Craig Reinarman surveyed people in California who used cannabis found they did so for many reasons. Reported uses were for pain relief, muscle spasms, headaches, anxiety, nausea, vomiting, depression, cramps, panic attacks, diarrhea, and itching. Others used cannabis to improve sleep, relaxation, appetite, concentration or focus, and energy. Some patients used it to prevent medication side effects, anger, involuntary movements, and seizures, while others used it as a substitute for other prescription medications and alcohol.[66]

Studies

Safety of cannabis

Main article: Long-term effects of cannabis

From The Lancet, "There are no confirmed published cases worldwide of human deaths from cannabis poisoning, and the dose of THC required to produce 50% mortality in rodents is extremely high compared with other commonly used drugs".[67]

According to Associate Professor Emeritus of Psychiatry at Harvard Medical School Lester Grinspoon, "When cannabis regains its place in the US Pharmacopeia, a status it lost after the passage of the Marijuana Tax Act of 1937, it will be seen as one of the safest drugs in that compendium".[68]

There are medical reports of occasional infarction, stroke and other cardiovascular side effects.[69] Marijuana's cardiovascular effects are not associated with serious health problems for most young, healthy users.[69] Researchers have reported in the International Journal of Cardiology, "Marijuana use by older people, particularly those with some degree of coronary artery or cerebrovascular disease, poses greater risks due to the resulting increase in catecholamines, cardiac workload, and carboxyhemoglobin levels, and concurrent episodes of profound postural hypotension. Indeed, marijuana may be a much more common cause of myocardial infarction than is generally recognized. In day-to-day practice, a history of marijuana use is often not sought by many practitioners, and even when sought, the patient's response is not always truthful. Thus, clinicians should be more vigilant in inquiring about use of marijuana in their patients, particularly among the younger adults who may present with cardiac events in the absence of cardiovascular disease or other obvious risk factors."[70]

A 2012 study published in JAMA and funded by National Institutes of Health looked at a population of over 5,115 American men and women to see whether smoked cannabis has effects on the pulmonary system similar to those from smoking tobacco. The researchers found "Occasional and low cumulative marijuana use was not associated with adverse effects on pulmonary function." Smoking an average of one joint a day for seven years, they found, did not worsen pulmonary health.[71]

Cannabis smoke contains thousands of organic and inorganic chemical compounds. This tar is chemically similar to that found in tobacco smoke or cigars.[72] Over fifty knowncarcinogens have been identified in cannabis smoke.[73] These include nitrosamines, reactive aldehydes, and polycylic hydrocarbons, including benz[a]pyrene.[74] Marijuana smoke was listed as a cancer agent in California in 2009.[75]

A 2006 study involving 1,212 incident cancer cases and 1,040 cancer-free controls found no causative link to oral, laryngeal, pharyngeal, esophageal or lung cancer when adjusting for several confounding factors including cigarette smoking and alcohol use.[76]

Regarding the relative safety of cannabis, former US DEA chief administrative law judge Judge Francis Young said:

> "There is no record in the extensive medical literature describing a proven, documented cannabis-induced fatality. ... Despite [a] long history of use and the extraordinarily high numbers of social smokers, there are simply no credible medical reports to suggest that consuming marijuana has caused a single death. In practical terms, marijuana cannot induce a lethal

response as a result of drug-related toxicity. ... Marijuana's therapeutic ratio is impossible to quantify because it is so high. ... Marijuana, in its natural form, is one of the safest therapeutically active substances known to man."[77][unreliable source?]

Pain relief

The effectiveness of cannabis as an analgesic has been the subject of numerous studies. University of Oxford doctors found that the brain on THC showed reduced response to pain, suggesting that the drug may help patients endure pain. Brain scans showed reduced activity in two centers of the brain where pain is registered: The mid-Anterior cingulate cortex and the right Amygdala. However, cannabis did not block the sensation of pain like morphine-based pain killers.[78] The researchers also found a great degree of variation among individual reports of pain relief.[79]

According to Stuart Silverman, M.D., a rheumatologist at Cedars-Sinai Medical Center, "Historically and anecdotally, marijuana has been used as a painkiller".[80] A Canadian study showed cannabis can reduce "nerve pain" from surgical complications or injuries. The study's twenty-one subjects suffered from chronic pain and patients who smoked cannabis with a 9.4% THC content reported less pain than those patients who smoked the placebo. Improved quality of sleep and reduced anxiety were other reported benefits.[81]Igor Grant, psychiatrist and director of the Center for Medicinal Cannabis Research at the University of California San Diego, has stated, "There is good evidence now that cannabinoids may be either an adjunct or a first-line treatment". Grant explained further that not everyone experienced pain relief, but the percentage of people who did was comparable to those who said that they experienced relief from other medications commonly prescribed for neuropathic pain (the subject of his study), such as antidepressants.[82]

A small-scale UCSF study found that patients with chronic pain may experience greater relief if cannabinoids were added to an opiate-only treatment regime. The findings further suggested that combination therapy could result in reduced opiate dosages.[83] The College of Physicians and Surgeons at Columbia University, U.S. published a study in the*Neuropsychopharmacology* journal in 2013 that is based on research that was conducted with fifteen males and fifteen females who smoked marijuana every day. The study's subjects were exposed to either a placebo, inhaled marijuana, or dronabinol, a pill that contains cannabis' psychoactive ingredient. Participants were monitored to ensure that they had not smoked in the time period immediately prior to the tests and did not have other drugs (including alcohol) in their systems. The researchers concluded that "Dronabinol administration decreased pain sensitivity and increased pain tolerance that peaked later and lasted longer relative to smoked marijuana", thereby providing evidence that the pill form was superior to smoked cannabis in terms of pain relief efficacy. However, the Columbia researchers further stated, "A primary caveat of the current findings is that the study population consisted of daily marijuana smokers; this study limitation should be considered when interpreting the findings and placing them within the context of the potential therapeutic feasibility of cannabinoids [for the general population]."[84]

Antiemetic

Several studies have established the antiemetic effects of cannabinoids in the treatment of chemotherapy induced nausea and vomiting (CINV).[85] Comparative studies have found cannabinoids to be more effective than some conventional anti emetics such as prochlorperazine, promethazine, and metoclopramide in controlling CINV.[86] Their use is generally limited by the high incidence of side effects, such as dizziness, dysphoria, and hallucinations.[87][88] Cannabinoids are considered reserve medications in the treatment of nausea and vomiting induced by cytostatics.[85]

Glaucoma

In glaucoma, cannabis and THC have been shown to reduce intra-ocular pressure (IOP) by an average of 24% in people with normal IOP who have visual-field changes. In studies of healthy adults and glaucoma patients, IOP was reduced by an average of 25% after smoking a cannabis "cigarette" that contained approximately 2% THC—a reduction as good as that observed with most other medications available today, according to a review by the Institute of Medicine.[89]

In a separate study, the use of cannabis and glaucoma was tested and found that the duration of smoked or ingested cannabis or other cannabinoids is very short, averaging 3 to 3.5 hours. Their results showed that for cannabis to be a viable therapy, the patient would have to take in cannabis in some form every 3 hours. They said that for ideal glaucoma treatment it would take two times a day at most for compliance purposes from patients.[90] Due to these limitations, the American Glaucoma Society, in a statement in 2009, did not recommend marijuana yet as a viable glaucoma treatment, even if it expressed hope that "marijuana or related compounds could protect the optic nerve not only through IOP [intra ocular pressure] lowering but also through a neuroprotective mechanism."[91]

Spasticity in multiple sclerosis

A review of six randomized controlled trials of a combination of THC and CBD extracts for the treatment of multiple sclerosis (MS) related muscle spasticity reported, "Although there was variation in the outcome measures reported in these studies, a trend of reduced spasticity in treated patients was noted." The authors postulated that "cannabinoids may provide neuroprotective and anti-inflammatory benefits in MS."[92] A small study done on whether or not cannabis could be used to control tremors of MS patients was conducted. The study found that there was no noticeable

difference of the tremors in the patients. Although there was no difference in the tremors, the patients felt as if their symptoms had lessened and their quality of life had improved. The researchers concluded that the mood enhancing or cognitive effects that cannabis has on the brain could have given the patients the effect that their tremors were getting better.[93][94]

Alzheimer's disease

Research done by the Scripps Research Institute in California shows that the active ingredient in marijuana, THC, prevents the formation of deposits in the brain associated with Alzheimer's disease. THC was found to prevent an enzyme called acetylcholinesterase from accelerating the formation of "Alzheimer plaques" in the brain more effectively than commercially marketed drugs. THC is also more effective at blocking clumps of protein that can inhibit memory and cognition in Alzheimer's patients, as reported in Molecular Pharmaceutics.[95] Cannabinoids can also potentially prevent or slow the progression of Alzheimer's disease by reducing tau proteinphosphorylation, oxidative stress, and neuroinflammation.[96]

A 2012 review from the *Philosophical Transactions of a Royal Society B* suggested that activating the cannabinoid system may trigger an "anti-oxidant cleanse" in the brain by removing damaged cells and improving the efficiency of the mitochondria. The review found cannabinoids may slow decline in age and disease-related cognitive functioning.[97][98]

Breast cancer

According to a 2007 and a 2010 study at the California Pacific Medical Center Research Institute, cannabidiol (CBD) stops breast cancer from spreading throughout the body by downregulating a gene called ID1.[99][100] This may provide a non-toxic alternative to chemotherapy while achieving the same results without the painful and unpleasant side effects. The research team says that CBD works by blocking the activity of a gene called ID1, which is believed to be responsible for a process called metastasis, which is the aggressive spread of cancer cells away from the original tumor site.[99][100] According to findings released by the team in 2012, when the particularly aggressive "triple-negative" cells (which contain high levels of ID1 and account for 15% of breast cancers) were exposed to CBD, they "not only stopped acting 'crazy' but also returned to a healthy normal state". Human trial models are currently in development.[101] Dr Sean McAllister, study co-leader, commented:[102]

> "The preclinical trial data is very strong, and there's no toxicity. There's really a lot of research to move ahead with and to get people excited"

HIV/AIDS

Investigators at Columbia University published clinical trial data in 2007 showing that HIV/AIDS patients who inhaled cannabis four times daily experienced substantial increases in food intake with little evidence of discomfort and no impairment of cognitive performance. They concluded that smoked cannabis has a clear medical benefit in HIV-positive patients.[103][104] In another study in 2008, researchers at the University of California, San Diego School of Medicine found that marijuana significantly reduces HIV-relatedneuropathic pain when added to a patient's already-prescribed pain management regimen and may be an "effective option for pain relief" in those whose pain is not controlled with current medications. Mood disturbance, physical disability, and quality of life all improved significantly during study treatment.[105] Despite management with opioids and other pain modifying therapies, neuropathic pain continues to reduce the quality of life and daily functioning in HIV-infected individuals. Cannabinoid receptors in the central and peripheral nervous systems have been shown to modulate pain perception. No serious adverse effects were reported, according to the study published by the American Academy of Neurology.[106] A study examining the effectiveness of different drugs for HIV associated neuropathic pain found that smoked Cannabis was one of only three drugs that showed evidence of efficacy.[107]

Brain cancer

A study by Complutense University of Madrid found the chemicals in cannabis promote the death of brain cancer cells by essentially helping them feed upon themselves in a process called autophagy. The research team discovered that cannabinoids such as THC had anticancer effects in mice with human brain cancer cells and in people with brain tumors. When mice with the human brain cancer cells received the THC, the tumor shrank. Using electron microscopes to analyze brain tissue taken both before and after a 26-to 30-day THC treatment regimen, the researchers found that THC eliminated cancer cells while leaving healthy cells intact.[108] The patients did not have any toxic effects from the treatment; previous studies of THC for the treatment of cancer have also found the therapy to be well tolerated.[108]

Opioid dependence

Injections of THC eliminate dependence on opiates in stressed rats, according to a research team at the Laboratory for Physiopathology of Diseases of the Central Nervous System (France) in the journal *Neuropsychopharmacology*.[109] Deprived of their mothers at birth, rats become hypersensitive to the rewarding effect of morphine and heroin (substances belonging to the opiate family), and rapidly become dependent. When these rats were administered THC, they no longer developed typical morphine-dependent behavior. In thestriatum, a region of the brain involved in drug dependence, the production of endogenous enkephalins was restored under THC, whereas it diminished in rats stressed from birth which had not received THC. Researchers believe the findings could lead to therapeutic alternatives to existing substitution treatments.[109]

In humans, drug treatment subjects who use cannabis intermittently are found to be more likely to adhere to treatment for opioid dependence.[110] Historically, similar findings were reported by Edward Birch, who, in 1889, reported success in treating opiate and chloral addiction with cannabis.[111]

Controlling ALS symptoms

The potential role of cannabis in treating symptoms of ALS (or Lou Gehrig's Disease) has been the subject of recent research. A survey was conducted on 131 people suffering from ALS. The survey asked if the subjects had used cannabis in the last 12 months to control some of their symptoms. Of the 131 subjects, 13 had used the drug in some form to control symptoms. The survey found that cannabis was moderately effective in reducing symptoms of appetite loss, depression, pain, spasticity, drooling and weakness, and the longest relief reported was for depression. The pattern of symptom relief was consistent with those reported by people with other conditions, including multiple sclerosis (Amtmann et al. 2004).[93]

Crohn's Disease

A study published on May 6, 2013 in the journal *Clinical Gastroenterology and Hepatology* revealed that subjects with Crohn's Disease experienced benefits from inhaled cannabis use. At the completion of the study's treatment period, ten out of the eleven patients that received cannabis treatment displayed substantial improvements in disease-related symptoms, while five of these patients experienced complete remission. The study's authors wrote: "... all patients in the study group expressed strong satisfaction with their treatment and improvement in their daily function." The study was small, but was designed as a randomized placebo-controlled clinical trial, the gold standard for a clinical trial.[112][113]

Diabetes

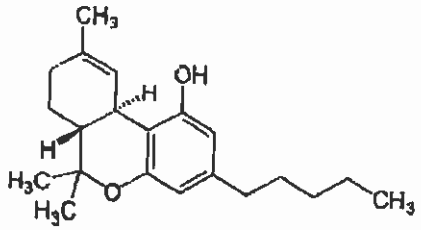
A study published on May 16, 2013 in the *Journal of American Medicine* revealed that regular marijuana use is associated with better glucose control. They found that current marijuana users had significantly lower fasting insulin and were less likely to be insulin resistant, even after excluding patients with a diagnosis of diabetes mellitus. Participants who reported using marijuana in the past month had lower levels of fasting insulin and HOMA-IR and higher levels of high-density lipoprotein cholesterol (HDL-C). These associations were weaker among those who reported using marijuana at least once, but not in the past thirty days, suggesting that the impact of marijuana use on insulin and insulin resistance exists during periods of recent use The Study there were also significant associations between marijuana use and smaller waist circumferences.[114]

Medicinal compounds

Cannabis contains 483 compounds. At least 80 of these are cannabinoids,[115][116] which are the basis for medical and scientific use of cannabis. This presents the research problem of isolating the effect of specific compounds and taking account of the interaction of these compounds.[117] Cannabinoids can serve as appetite stimulants, antiemetics,antispasmodics, and have some analgesic effects.[118] Six important cannabinoids found in the cannabis plant are tetrahydrocannabinol, tetrahydrocannabinolic acid, cannabidiol, cannabinol, β-caryophyllene, and cannabigerol.

Tetrahydrocannabinol

Main article: Tetrahydrocannabinol

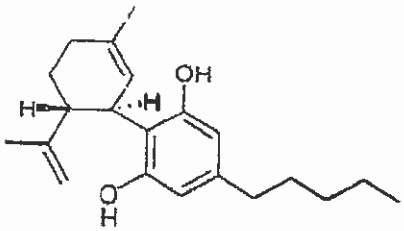


Chemical structure of tetrahydrocannabinol (THC)

Tetrahydrocannabinol (THC) is the primary compound responsible for the psychoactive effects of cannabis. The compound is a mild analgesic, and cellular research has shown the compound has antioxidant activity.[119] THC is believed to interact with parts of the brain normally controlled by the endogenous cannabinoid neurotransmitter, anandamide.[120][121] Anandamide is believed to play a role in pain sensation, memory, and sleep.

Cannabidiol

Main article: Cannabidiol

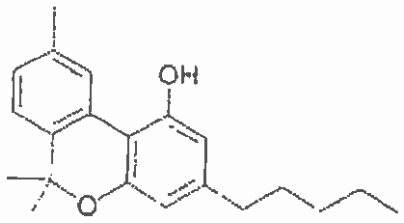


Cannabidiol has been shown to relieve convulsions, inflammation, anxiety, cough, congestion and nausea, and it inhibits cancer cell growth.[122]

Cannabidiol (CBD) is a major constituent of medical cannabis. CBD represents up to 40% of extracts of medical cannabis.[123] Cannabidiol has been shown to relieve convulsion, inflammation, anxiety, cough, congestion and nausea, and it inhibits cancer cellgrowth.[122] Recent studies have shown cannabidiol to be as effective as atypical antipsychotics in treating schizophrenia[124] and psychosis.[125] Because cannabidiol relieves the aforementioned symptoms, cannabis strains with a high amount of CBD may benefit people with multiple sclerosis, frequent anxiety attacks and Tourette syndrome.[92][122][126]

Cannabinol

Main article: Cannabinol

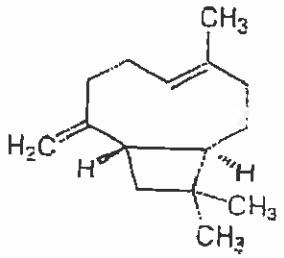


Structure of cannabinol

Cannabinol (CBN) is a therapeutic cannabinoid found only in trace amounts in *Cannabis sativa* and *Cannabis indica*.[127] It is mostly produced as a metabolite, or a breakdown product, of tetrahydrocannabinol (THC).[128] CBN acts as a weak agonist of the CB_1 and CB_2 receptors, with lower affinity in comparison to THC.[129][130]

β-Caryophyllene

Main article: Caryophyllene



Chemical structure of β-caryophyllene

Part of the mechanism by which medical cannabis has been shown to reduce tissue inflammation is via the compound β-caryophyllene.[131] A cannabinoid receptor called CB2 plays a vital part in reducing inflammation in humans and other animals.[131] β-Caryophyllene has been shown to be a selective activator of the CB2 receptor.[131] β-Caryophyllene is especially concentrated incannabis essential oil, which contains about 12–35% β-caryophyllene.[131]

Cannabigerol

Main article: Cannabigerol

Like cannabidiol, cannabigerol is not psychoactive. Cannabigerol has been shown to relieve intraocular pressure, which may be of benefit in the treatment of glaucoma.[132][133]

Cannabigerol

Pharmacologic THC and THC derivatives

In the U.S., the FDA has approved several cannabinoids for use as medical therapies: dronabinol (Marinol) and nabilone. These medicines are taken orally.

These medications are usually used when first line treatments for nausea and vomiting associated with cancer chemotherapy fail to work. In extremely high doses and in rare cases "psychotomimetic" side effects are possible. The other commonly used antiemetic drugs are not associated with these side effects.

Marinol's manufacturer stated on their website: "The most frequently reported side effects in patients with AIDS during clinical studies involved the central nervous system (CNS). These CNS effects (euphoria, dizziness, or thinking abnormalities, for example) were reported by 33% of patients taking MARINOL" [134][135] Four documented fatalities resulting from Marinol have been reported.[136][137]

Canasol is a cannabis-based medication for glaucoma that relieves intraocular pressure symptoms associated with late-stage glaucoma.

It was created by an ophthalmologist, Dr. Albert Lockhart and Dr. Manley E. West, and began distribution in 1987.[138][139] As of 2003, it was still being distributed in the United Kingdom, several U.S. states, and several Caribbean nations.[140]

It is notable for being one of the first cannabis-containing pharmaceuticals to be developed for the modern pharmaceutical market and being one of the few such pharmaceuticals to have ever been legally marketed in the United States.[139][141]

The prescription drug Sativex, an extract of cannabis administered as a sublingual spray, has been approved in Canada for the adjunctive treatment (use alongside other medicines) of both multiple sclerosis and cancer related pain.[142][143] Sativex has also been approved in the United Kingdom, New Zealand, and the Czech Republic, and is expected to gain approval in other European countries.[144][145][146] William Notcutt is one of the chief researchers that has developed Sativex, and he has been working with GW and founder Geoffrey Guy since the company's inception in 1998. Notcutt states that the use of MS as the disease to study "had everything to do with politics."[147]